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ABSTRACT

This essay considers the need for economic retrenchment, environmental conservation, and the implications of these positions for teaching. Facing an environmental crisis, overpopulation, and an ever-increasing reduction of natural resources, education in the future must concentrate on teaching about the futility of growth, planned and unplanned. This emphasis on a nongrowth economy will, in turn, affect how teachers must approach values issues and traditional subjects now taught in schools. The gross materialism and status achievement of Western culture will have to be downplayed for a more egalitarian commitment to global sharing. Suggestions for how teaching will change on such issues and subjects as achievement, world studies, social-class status, ethics, progress, the social ethos of the school, philosophy, economics, civics, sex education, population, energy, death, and higher education are outlined. (Author/DE)

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ALTERNATIVES TO GROWTH: EDUCATION FOR A STABLE SOCIETY

Robert M. Bjork and
Stewart E. Fraser

FASTBACK
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ALTERNATIVES TO GROWTH: EDUCATION FOR A STABLE SOCIETY

By Robert M. Bjork and Stewart E. Fraser

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TABLE OF CONTENTS

A Scene From the Future? 7

Introduction 10

Education and the Transition to No-Growth 13

Education After the Transition 15
- Teaching About Achievement 15
- Teaching About the Wider World 16
- Teaching About Social Class 16
- Teaching Ethics 17
- Teaching About Progress 17
- The Social Ethos of the School 18
- Teaching Philosophy 18
- Teaching Economics 19
- Teaching Civics 20
- Schools and Sex Education 22
- Teaching About Population 22
- Education About Energy 25
- Education About Death 28
- Higher Education in the Future 28

Straws In The Wind 30
- Current Trends 30
- A Last Word 32

Recent Publications Relating to the Steady-State Concept 33

A SCENE FROM THE FUTURE?

In a modestly furnished living room, John, age ten, is sprawled on a sofa. His eyes are focused on a book, and occasionally his brow wrinkles as he scans the pages. Catching a whiff of a cheesy smell coming from the kitchen, he calls out, "What's for supper, Mom?"

"Your favorite. Zucchini parmesan. Come into the kitchen and help me set the table."

"Okay," he says, walking into the kitchen. "Hey, Mom, you know this book I'm reading, it says that actors and athletes used to get huge salaries—sometimes ten times as much as teachers. Why was that? Why would they want it?"

"Well, son, life was different then. Lots of actors and athletes spent a lot of money buying expensive clothes one season that they would replace the next season. Sometimes people wore an outfit only once before they got rid of it. There were fads—oh, like the hemlines of women's skirts would change, so that women would have to buy new wardrobes to keep up with the styles."

John wrinkled his nose. "That stinks. Why would everyone want different clothes—and why would they quit wearing them if they weren't worn out? I mean, clothes are just something to keep you comfortable."

"But John, people thought differently then. Some people bought a new car every year or two, and the looks of the cars changed every year."

"Wow—do you mean that cars wore out in a year or two?"

"Oh, no, though some people mistreated their cars. But cars were like clothes—the styles changed, and many people competed to see who had the biggest or newest or most expensive car."

"I just can't imagine that. Our car is twelve years old, and I expect we'll still have it ten years from now. People back then must have been really stupid to not take good care of cars and make them last as long as possible. And what good is it to change the way a car looks every year unless that makes it more efficient?"

Mother sighed. "That's the way people were thinking when I was born. There sure have been some changes in the last thirty-five years—in schools, in salaries, in the reasons why people work, in television, in stores, in the whole society."

John thought for a second, then asked, "How did it ever get that way in the first place? Didn't people know that the earth had a limited amount of resources? Every second-grader knows that. Didn't they know that there was only so much of everything to go around before things would start running out? Why would some people take so much more than others? That wasn't fair, was it?"

"I guess some people believed they deserved more than others because they worked harder or knew more or were more important. Now we realize how little is really necessary for comfortable survival and that material possessions aren't always necessary or even good for a happy life. John, people used to work to make money so they could own more things. Many women worked at poorly paid and boring jobs just to add extra dollars to the family income so the family could have a bigger house or a better car or a fancier TV set. In the late 1960s, just before I was born, the population of the United States passed 200 million, and everyone celebrated."

"Yeah, we heard about that in school last spring, when we celebrated that the population had dropped below 200 million."

"Yes, that shows how changes in sex education and birth control methods have succeeded in stopping our population growth. Women got married much younger in 1950. And today contraceptive methods are so much improved. Many people have no children, and few people have more than two. And a lot of the change has happened because the schools teach the very young about abortion and contraception. Now we don't want to chance it that

some parents are misinformed or feel uncomfortable talking to their children."

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How unlikely is this conversation from the beginning of the next century? How widespread will a shift in attitudes such as the one pictured here become?

INTRODUCTION

For most of America's history, its people have possessed an optimistic, "can do," "if there's a will, there's a way" attitude. Both educationally and politically this has been a great asset. Until lately, any dissent from this philosophy has been brushed aside as negative thinking unworthy of good citizens. Schools certainly reflected the optimistic philosophy of the American dream and of an everlastingly bountiful cornucopia.

But now a perceptible shift is occurring. Bountiful nature seems less plentiful; globally, severe environmental drawbacks appear with technological change; steady population growth is no longer viewed with unmixed approval; some people listen to those who call for an end to irresponsible growth. We are becoming aware that science, though it unfolds many possibilities, also sets clear limits. Unfortunately, many school children as well as adults have not learned some things cannot be done.

We energetically persist in a whole range of activities nullifying the very ends we say we deeply desire. We want a world that is clean, largely free of poverty, educated, peaceful, and humane. We want these goals to be realized for succeeding generations. However, we are busily engaged in activities that in only a few decades will make these goals ever more impossible to realize.

The villain in our outlook is our growth mania, which leads us to a completely unsupportable position—a denial of the obviously finite nature of our world. Many thoughtful people are convinced that we must alter our ways to gain the ends we fervently hope

for. "Replacement" and even "reduction" rather than "growth" or "increase" must be watchwords, both in resource depletion and in population size.

An increasing amount of evidence supports these opinions. Already we are beginning to see serious and recurring shortages of important fuels and metals in the United States and most western European nations. About half of the world metals will face depletion in the relatively near future, according to some experts.

Wholesale prices are advancing at unprecedented rates, and inflation is rampant. Many developing countries are experiencing increasing malnutrition or outright famine. They are unable to pay for petroleum products or fertilizers necessary to sustain their agricultural economies. Real per capita income in many countries is either static or declining.

This fastback considers one important theoretical position that points to the need for retrenchment and conservation and discusses the drastic implications of this position for education. The theory is quite simple: It states that every new human activity, whether digging a mine, driving a car, or adding yet one more person to the population, accelerates the deterioration of our earthly environment. This effect is irreversible and unending. Even recycling can slow only slightly this deterioration.

Organisms, except for green plants, speed up environmental deterioration. This hastening is particularly noticeable in urbanized and industrialized economies that use great amounts of energy and materials. Inevitably, ever-increasing numbers of people using more terrestrial energy and materials will find fewer and fewer resources to draw on.

The more quickly the environment deteriorates, the sooner the human species will face the possibility of extinction. Thus, the longer the life we want for our species, the sooner we must effect a cessation of growth. In fact, some severe reductions in the use of terrestrial energy and materials and a surplus of deaths over births for a rather long time, which would cause a decline in population, would lengthen our life span as a species. Therefore, if future generations deserve our attention, we must argue against growth in the economy and in population. If we do not believe generations to come are our concern, then the ethics of the extravagant wastrel caring only for the moment are ours by default. If we choose to consider future generations, then we must

agree that it will soon be necessary to reverse patterns by ending growth and to start teaching our children about the futility of growth, planned or unplanned.

What is the role of education in all this? First, during transition from growth to a steady state and then perhaps a declining economy and population, certain difficult demographic and economic problems and choices will face the educational establishment. These difficulties will rapidly increase during the next ten to twenty years. What action should education take? Second, what can be said about the probable nature of education in a future stable or declining state?

EDUCATION AND THE TRANSITION TO NO-GROWTH

Obviously, a steady or declining population calls for fertility rates far lower than the rates that prevailed in the United States during the late 1940s, the 1950s, and the early 1960s. In the late 1950s, fertility rates began to fall sharply in the United States. Comparing the number of live births for 1,000 women ages 15 to 44 in 1957, which was 124, with the figure for 1974, which was 65, one sees that current fertility is now only about half as great as it was a very short time ago. Not only have fertility rates declined, but also the absolute number of births has fallen from 4.2 million in 1960 to 3.1 million in 1974. This means elementary grades are already beginning to feel declines in enrollment. Soon the secondary grades will experience the same phenomenon. In the 1980s colleges will see fewer students, unless an unprecedented increase in the proportion of 18- to 21-year-olds going to college occurs, or the number of middle-aged and older people attending grows.

This will force a different perspective on education. Large capital outlays for buildings will certainly diminish. Much attention could be given to the advantages of small teacher-pupil ratios. But such plans may be undercut by cost-conscious and quality-indifferent administrators. Much better prepared teachers could be hired from a larger pool of teacher applicants. But the latter advantage may be frustrated by poor recruiting practices or by efforts to hire only novice teachers whose entry salaries are lowest on salary scales. Of course, the fact that it will not be possible for every teacher trainee to find a place will be unfortunate for

some. In addition, a large supply of potential teachers overhanging the market may lead to overly arrogant and perhaps poorly considered administrative practices. The great spurt in industrial unionism came in the United States between 1937 and 1939, when unemployment was extremely high. Likewise, we may see the greatest growth in teacher unions, militancy, and collective bargaining during the next decade when times are hard.

The end of economic growth, both its probability and desirability, is debated more these days than population stabilization. Yet conditions and policies will begin to impose a long-run slowdown and finally a cessation of economic growth. During the transition we shall perhaps witness "stagflation"—rising prices coupled with high rates of unemployment and decreasing growth rates and perhaps negative rates applied to GNP in some years. Schools will face some stringent financial problems locally and statewide, and the tiny proportion of school support, about 8 percent, currently emanating from Washington will increase substantially, if congress follows the wishes of the public. In a Gallup poll conducted in June, 1975, almost 50 percent of those surveyed selected public education as one of their top three choices for greater federal funding. Overall, education ranked second after health care and was followed by law enforcement as areas most needing additional federal money. Another change is that schools that have motivated students by constantly reiterating that education is a good investment will find this stimulus less effective when differential earnings by amount of education become less striking.

EDUCATION AFTER THE TRANSITION

Far more important is the nature of the school after a transition. Again we are thinking mainly in American terms, though much might apply to other countries. How much should and will schools change under the new conditions? We assume that any future steady or declining state will maintain the rational ethos of Western culture but without its unsustainable dynamism. We do not expect that some mystical and wholly nonrational ethos will be the reaction to a cessation of growth. When the term "steady state" is used in the following pages, one might mentally add "or declining state" to it.

Teaching About Achievement

Schools and the mass media are increasingly crucial elements in the socialization of children. Until now, economic growth has been encouraged by extolling achievement in status. This aspect of the school's effect on the mind-set of the child will have to change. Achievement will still be extolled, but different methods of achievement will be admired. To aspire to be a captain of industry or businessman expanding an industrial empire will be thoroughly discouraged as we now condemn aspirations to become an outlaw. Whatever is left of the business entrepreneur as an exemplar in American ideology will quickly disappear.

The forms of achievement the school ethos should sanction will be aspirations such as the wish to be a great scholar, artist, pure researcher, or poet. Various paths to eminence in less exalted

realms could be promoted. Hundreds of possibilities leap to mind. Eminence in cooking, entertaining, bookbinding, wine tasting, teaching, landscaping, repairing, and library work would be much admired. Prowess in sports such as hiking and tennis (but not auto racing) would be encouraged. Clearly, the rhetoric of growth, unceasing development, bigness, and so forth will have to be replaced with their antonyms.

Teaching About the Wider World

Another socialization function of schools in modern societies has been to give the child a more cosmopolitan outlook than the limited world of family or neighborhood. In the steady or declining state, this function will persist in a different form. Extolling domestic and international travel will be much restrained. The use of television, radio, books, and pictures to introduce the wider world of community, nation, and work will be more prevalent. With political socialization, schools have tried to create national sentiment in their pupils. This will continue, but positive national feeling will not be fostered by eulogizing the bigness or the past growth of the country. Instead, the neatness, quietness, prudence, nonwastefulness, and steady conditions of the country will become the revered virtues that will inspire national feelings in the child.

Teaching About Social Class

Children learn in school the symbols which represent their place on the social scale. In the steady state, a determined effort to reduce this role of material goods must be made. Size of home, size or make of car (or even owning one), size and number of appliances, financial ability to take long trips to distant places, and so on must be completely downgraded as status symbols. In place of gross materialism we must upgrade such symbols as academic degrees, library and record collections, flower gardens, and ability to walk, hike, fish, talk, and write.

One might argue that this discussion of education in a future steady state is extraordinarily utopian and unrealistic. Such change in schools is, one might think, quite impossible. But schools do

change as society changes. If someone had told the masters at Harvard who were training ministers of religion in the seventeenth century that three centuries later huge labs with scientists conducting research would dominate Harvard, he would have been laughed at.

Teaching Ethics

Ethics communicated in schools by direct teaching or by conscious and unconscious communication of sentiments will in some details have to be quite different in the steady state from what has prevailed. We have emphasized equality of opportunity rather than equality of condition. Schools have generally eulogized the idea of "giving everyone a fair chance" but have put little emphasis on "giving everyone a fair share"—much less an "equal share." Kenneth Boulding says, "In the stationary state . . . if one person or group becomes richer, the rest of the society must become poorer." With the size of both the economic pie and the population stable or declining, children must be taught that the only ethical way to cut the pie is to strive to give everyone the same size piece. Of course, just as our present ethic of equality of opportunity is not realized fully in practice, neither will a future society divide its pie exactly equally. But, certainly, more equality of opportunity exists in the United States today than would have if we had not emphasized this ideal to generations of students in our schools. So, too, in the declining or steady state, more equality in shares will exist if schools inculcate the ethic of equality of condition.

Teaching About Progress

Schools tend now to favor the good of "progress" against the evil of "retrogression" or "lack of progress." "Standing still" has been condemned in textbooks and class lectures for generations. In a future society with a no-growth population and economy, the idea of progress will have to be reconsidered. "Progress" would still be valued highly, but the word will not apply to ideas now considered by most people as essential factors in progress. Growth in population for a city, region, or nation will not be considered progress. In a steady state some areas undoubtedly will lose

population while other areas gain, but such an occurrence will not be an occasion for rejoicing or for despair. Instead, such a shift will be looked on with analytical interest, rather like a doctor deciding whether certain symptoms in a patient are benign or malignant, and, if malignant, prescribing curative measures. Present-day ideas that more and taller buildings, new and more elaborate gadgets, and more and wider highways are centerpieces of progress will be treated in steady-state schools as outmoded, superstitious misconceptions, rather like we now consider belief in witches so real in seventeenth century Massachusetts. Progress will be represented as gains we make in areas such as morals, art, literature, health, neatness, and learning. Technological improvements will not be thought central to progress—but improvements consistent with savings in resources will be welcomed as individuals now welcome a windfall inheritance.

The Social Ethos of the School

In the social ethos of steady-state schools, the model of present American public schools will not be closely followed. Since wasteful fashion in clothes and other items will be devalued, schools where students wear similar or identical and long-lasting clothing will be thought more reasonable. If prudence and careful husbanding of materials and energy are taught in school, then both academic and nonacademic aspects of schooling must reinforce those values. In a steady state, longlastingness and reuse of goods are crucial. Herman Daly says the steady state implies "greater . . . durability of goods and less time sacrificed to production." If personality is to be expressed in school, it will have to be in ways other than conspicuous fashion.

Teaching Philosophy

Perhaps a very different perspective on the problem of ends and means will dominate in steady-state schools. At present a kind of relativism pervades discussions of this question, with a great amount of fuzziness when distinguishing between what is an end and what is a means. We are constantly made aware that means in one society are ends in another. We lack clear standards for judgment in setting priorities. And we tend not to judge which

society is "right." This situation will have to be changed in steady-state schools. For example, in the following dilemma, a certain viewpoint will be espoused. Nicholas Georgescu-Roegen points out the dilemma: "Economic development through industrial abundance may be a blessing for us now . . . but it is definitely against the interest of the human species as a whole, if its interest is to have a life span as long as is compatible with its dowry (of available resources)." The student will learn that the interests of the human species as a whole are more important than the immediate generation's interests. In other words, schools in the steady state must insist on long-range values. Current trends toward relativism and individualistic sentimentalism will have to be arrested. This is the most difficult problem of philosophical balancing that steady-state schools will face. An acceptance of the scientific view that emphasizes suspended judgment will have to be combined with a nonscientific reverence for "good" that is based on eternal verities. It is probably true that the steady-state society will have a good deal of potential or actual regulation based on quantitative and scientific criteria, but manipulation must be kept to a minimum.

John Dewey thought that scientific experimentalism could set both ends and means for people by pragmatically allowing what worked to prevail, but children should be taught in a steady state that this view is incorrect; they will have to judge ends in terms of certain permanent values, yet remain scientific about means.

Children will be taught the ancient Greek viewpoint that economic endeavor belongs strictly in the realm of means and that an urge to accumulate money for its own sake is unnatural and thus unethical. As a means, economic behavior should be adjusted to accommodate and advance such long-run ends as a lengthy and stable role for a humane civilization. In steady-state schools, some modification of our highly individualistically based career decisions will be essential. Some middle path allowing individual preference in broad areas of approved endeavor may evolve.

Teaching Economics

Economic aspects of society will be taught in steady-state schools with an emphasis different from today's. Current emphasis on

growth will give way to a focus on minimizing the flow of production as much as possible while maintaining a constant or slightly declining stock of capital and people. How far this minimizing can go will catch the student's attention instead of the current issue of why real GNP is or is not increasing at some posited desirable rate. Criteria for judging how minimal the flow should be or could be will include consideration of an old philosophical problem: What amount of material well-being is a necessary condition for a good life? Since inequality in claims people have or in the flow of wealth will surely have been much reduced in the steady-state society, analysis will focus on how one can best resist frivolous fashion, unrewarding travel, unstimulating social events, and all kinds of unessential consumption. Economists such as Veblen and J. S. Mill will loom large as historical seers, while the standard neoclassical tradition will be of less interest.

To repeat a point made previously, the student will understand much more clearly than at present that economic goods are means, not ends and why these are necessary *but never sufficient* conditions for a good life. In our current school ethos this distinction is blurred for many students. In fact, many incorrectly think that material goods are not only necessary but also entirely sufficient conditions for the good life.

Teaching Civics

Civics in future steady-state schools will clearly be describing a very different range of political factors. To transform a growth society into a steady-state or declining society in any controlled manner will call for Draconian measures, we hope within a democratic political environment. However, compromise, log rolling, pork barrel, and similar legislative tactics will most likely be inappropriate for either a transformation to or a proper maintenance of a steady-state society. The perennial problem of rulership will be of great importance in the civics curriculum, and a reconsideration of ancient philosophers will surely attract much attention. For example, in *The Republic*, Plato was concerned with creating a blueprint by which societies could reach what he considered to be the ideal conditions for humans to live their lives. Those conditions included as the most important criterion that people

would achieve justice in relations among themselves. However, "justice" did not imply for Plato what it might imply for most moderns. It did not mean equality of status for all, nor did it imply equal opportunity for all in the race to achieve wealth; it meant that relations between people would ensure stability in the social order. This stability had to be achieved knowing that a society was founded on division of function. In this society, some would concentrate their work on one thing and others on something else. This meant that exchange between them would occur.

Society would achieve the greatest stability, and therefore the greatest justice, if all people tended carefully their own tasks and did not meddle in the tasks of others. To Plato, the problem of ensuring that each member of society tended to a special purpose implied a most important specialization—that of governing the whole society. In an ideal society persons will not be expected to perform tasks as specialists when they are not trained. Society should guarantee that people entrusted with the specialized duty of governing the society be capable. The American spoils system would certainly not find favor with Plato. This difficult problem was to be met by a two-fold approach. People chosen to govern were to be those with proved philosophical aptitude, and, once selected, they had to be tied to their specialized task of governing by living in conditions that removed all temptations to govern badly. One thing that will attract much attention (perhaps unfavorable) for steady-state students is that Plato considered family ties and ownership of property, though little damaging to a person specialized in making shoes or growing livestock, completely corrupted a person specialized in governing. Thus, a communal ownership of property, spouses, and children was to be instituted among those who ruled society. To Plato, of all the specialities of society, governing required the most learning.

For a civics student in the steady state, what can be gained from a consideration of Plato's conceptions? The Platonic emphasis on stability and order takes on added importance as we evolve into a steady state. On the negative side, it would appear that Plato assumed the majority of people, not capable of education in his sense of the word, were vastly more malleable than they seem to us. Even modern totalitarian states can alter mores and attitudes of their people only to a limited degree. In short, an uncorrupted and philosophically educated governing

group may be necessary for maintaining a steady state, but democratic processes may not need to be limited as much as Plato considered necessary.

One Platonic condition will certainly be true in the steady state. Women will be politically and economically equal to men. Equality of the sexes will be taught as a matter of course. Since women will bear few children, they will want to enter the life of the world outside the home.

Schools and Sex Education

A rational and uncensored viewpoint of sex education will be fostered in schools. Exact facts of reproduction, contraception, and abortion will be taught to young children. No reliance on the family, the media, or peer groups will confuse the school's responsibility for sex education. Facts about basic biological processes and reproductive organs will be clearly presented. Sex will be treated as an important subject to be taught the same as economics, history, or chemistry. No sex-segregated classes, no nurses, no doctors in white coats as special authority figures, and no arguments about this subject being unsuitable for seven-year-olds will characterize sex education procedures.

Teaching About Population

Although a very small part of the curriculum emphasis in current school settings, the study of population will become a major concern in steady-state schools. Young children will understand that no species can long sustain a situation where births exceed deaths. Although little attention to this fact is given in our schools, children in steady-state schools will be well versed on population balance. It will be obvious to them that if births cannot exceed deaths indefinitely, then in any particular situation where births exceed deaths, factors will, at some point, act on either births or deaths to end the imbalance. An English economist, Thomas Malthus, labeled these factors "checks," and school discussion will center on the nature of these checks.

These checks are of two kinds—those decreasing the number of births and those increasing the number of deaths. Malthus called the former preventive and the latter positive. In future classroom discussions no one will dodge the fact that operation of these checks is inevitable. It will be pointed out that preventive and positive checks must be considered trade-offs. In other words, the more preventive checks are used, the fewer positive checks will be needed, and vice versa. (Positive checks cannot be eliminated because death by old age will always be a positive check). Since positive checks involve horrors such as famine, disease, and war, teachers will make it clear that preventive checks are essential. Further, they will discuss preventive checks and make a judgment on the reasonableness of each.

Preventive checks will be considered in classroom discussion under five headings: 1) abstinence, temporary or total, from sexual intercourse; 2) aborting, both induced and natural, of a fetus; 3) contraception, mechanical (such as condoms, diaphragms, and IUDs), and chemical (such as oral pills and injections); 4) sterilization (both natural and induced); and 5) infanticide.

The historical importance of induced abortion will be explained in class discussion. Induced abortion spread throughout the civilized world from early times and was, and is, also common among primitive peoples. As a preventive check, abortion, whether legal or illegal, probably has been historically the most widely used. The teacher's stance on abortion in steady-state schools will depend on the state of contraceptive technology. If technology has advanced so that only very irresponsible or perverse people have unplanned pregnancies, then abortion will be considered a necessary procedure, but one good citizens would almost never have to resort to. If technology is less advanced, then abortion will be looked upon as a backup procedure for a less than perfect contraceptive program. Technological aspects of abortion will be taught in sex education.

Particulars of contraception will be taught in sex education, but in the population context students will be told that as a preventive check it has become very important. It achieved that importance in the twentieth century, as the use of devices such as the condom and diaphragm spread throughout much of the population in Europe and the United States. Later in the twentieth

century the contraceptive pill and the IUD had an important impact in various parts of the world.

When technology has achieved a reversible form of sterilization, it will be taught about as a form of contraception. The effect of sterilization will be the same as pills, IUDs, injections, and so forth. Sterilization, it will be pointed out, had little importance as a preventive check until the last part of the twentieth century.

Finally, abstinence as a preventive check will be considered. The students will learn that abstinence has affected certain groups through history. Religious orders have sometimes enjoined celibacy. Primitive religion often prescribed continence for long periods. No doubt many married people have quit having intercourse at some point long before menopause. But it must be taught that the impact of abstinence as a preventive check has been fairly small and is unlikely to increase. The steady-state school ethos will neither condemn nor eulogize abstinence. Sexual intercourse as an expression of love and concern will be approved. Exploitive sexual intercourse, along with robbery, lying, and other immoral practices, will be, both in textbooks and in class discussion, strongly condemned. Of course, no unplanned (or if regulated, unauthorized) offspring will be sanctioned. These matters will also be considered in sex education. Emphasis will be on society's need for a balance between births and deaths or perhaps deaths exceeding births for a time. If voluntary decisions create this balance, societal deterrents or incentives will be unnecessary. Schools in the steady state will clearly show that regulation of the total number of births is a proper and necessary concern of government. If regulation is not needed at one time, this will not alter the possibility that some future government may need to exercise control by using rewards or some other system. Children will consider this regulation or potential regulation proper, just as we now accept regulation of TV channels or air transportation.

Migration will also be discussed. Teachers will insist that no migration from countries that have not controlled their numbers through preventive checks into steady societies can be allowed, and that national regulation of this must be persistent and severe. Some reasonable population movements between no-growth societies may be advantageous; the students can debate under what conditions this may be so.

Schools in the steady state will insist that all students understand the crucial impacts on humankind of the physical world about us. Understanding of energy will no longer be possessed by only a small, knowledgeable elite. The naivete of the present generation about energy must not persist in the future steady state.

Students will learn that energy from the sun is one source that can serve generations of people extending into the future. Coal, oil, natural gas, and uranium are subject to ever-narrowing availability. At some point the cost of getting new energy from nonsolar fuels equals or exceeds the new energy garnered. Further, even if all these sources could be exploited without regard to energy costs, they still are very limited. For example, earth's entire fossil fuel store is equal in energy to only about two weeks of sun energy captured by earth. Even if fusion energy someday becomes possible, the Second Law of Thermodynamics, which says that energy always tends to go over into an unusable form, still points to limits in the length of time fusion can provide energy. Terrestrial forms of energy are in every case gradually transformed into heat, and heat becomes so dissipated that it can no longer be used. All this is not so terribly complicated, but we teach this area poorly now because it runs against our technological religion. In the steady state the idea of limits will be quite acceptable, and teachers will not have to overcome invincible ignorance based on false religion.

One can imagine a number of ways in which teachers could simplify this idea. A teacher might draw a jar on the board; she would point out that this jar could never be replenished. So when the contents were completely exhausted the process could not be continued. Figure 1 illustrates this:

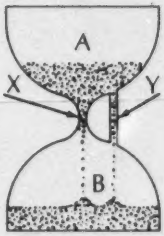

Figure 1

Useful energy (A) slowly dribbles through the opening X, whether or not someone opts to use it. When a person decides to use it, this use adds another opening, which is labeled Y.

The wider the Y opening is made, the faster usable energy disappears. In the

modern world the Y opening is getting too wide. The steady-state child will have to learn that this opening must be made small so that energy will last as long as possible. Terrestrial sources of fossil fuels will be useful to supplement sun energy and to provide raw materials for several important petrochemical products. The example does not apply to solar energy.

Solar energy comes to us in a steady flow from outside our earthly system, and will continue to do so for billions of years. Steady-state teachers should impart a sense of reverence toward the sun, because it is the source of our energy. It causes rain and energy derived from falling water; it builds our vegetables, fruits, and meats; it made what fossil fuel we have left; it drives our windmills and sailboats with sun-caused wind; it builds and powers the draft animals; and it gives us organic fertilizer. Children should be reminded that our ancestors understood the great gifts of the sun. They will, in their historical learning, come to a new appreciation of old Egyptian hymns to the sun. A few passages from a "Hymn to the Aton" written almost 3,800 years ago, here illustrate our meaning:

Thy rays encompass the lands to
the limit of all that thou hast made
. . . Though thou are far away,
thy rays are on earth

. . . When thou settest in the
Western horizon, the land
is in darkness, in the
manner of death

When thou shinest as the
Aton by day . . .

All beasts are content
with their pasturage;
trees and plants are
flourishing

Thou didst create . . . all
men, cattle, and wild beasts.

People, both in their biological individual bodies and in their collective economic and social organism, live by using energy. Highly ordered matter and energy are consumed and returned to the surrounding environment in a much less usable form. Deterioration of the surrounding environment is always greater than the order achieved. These facts can be taught to very young children using literally dozens of devices and examples. A unit on farm life could be constructed noting how relatively highly ordered feed for animals becomes much degraded after it passes through an animal and becomes manure. This would illustrate the point very well. Also, students would observe that the energy that built the feed was sun energy. For another example, children can learn how coal was formed by compressing primeval forests built by sunlight into beds under the ground, which now, millions of years later, we can dig up and burn. The sun's energy has been stored there for all these years. But when we burn it, the heat-energy dissipates, and the remaining ashes are in a less usable form than the original coal.

A teacher can bring a glass of water into class and cool it by adding ice cubes. The class will observe the expected melting of the cubes and the cooling of the water. This simple process is fraught with tremendous importance. It can be explained to students that when the cubes were unmelted, more heat was in the water than in the ice cubes. But, when the cubes melted, the amount of heat energy in the water and in the cubes still existed in the water. However, the difference of temperature between the water and cubes had disappeared, and the ice cubes could never form again by themselves. In a tropical climate (with the temperature never falling below freezing), one can never get more ice cubes to cool another glass of water unless some usable energy is found to extract heat from some water. In making this ice, energy will diffuse into unusable heat as the ice forms. For example, to get more ice cubes from an electric refrigerator, one must rely on some energy source to create electricity, which is used to extract heat from water in the refrigerator. As ice melts, the water is again cooled, but a good deal of energy has been changed into a dissipated and useless form. The ice is gone, and more energy must be used to get electricity if we are to have more ice. Energy is always dissipated into an unusable form in the end.

Thus, students can easily understand that all energy constantly tends to go to an unusable form.

These kinds of examples are not common in schools now simply because any physical law that seems to restrain human ingenuity is vaguely heretical.

Education About Death

Acceptance of a rational attitude about death and extinction will be a prominent feature of steady-state schools. Even now we see some feeble efforts to get so-called "death education" into the curriculum. The steady-state student will understand that each person begins to die at the instant of birth. Further, the student will clearly comprehend that homo sapiens will, at some point, become extinct. It might be argued that such education will induce fatalism, thus frustrating the importance of other aspects of the curriculum. This is a false dilemma, implying that reason is compatible only with optimism and a denial of limits. Such a view is based on nineteenth century history and ideas of "progress."

Higher Education in the Future

What will higher education be like in a steady state? Frenetic activity directed toward economic growth will, of course, have largely disappeared. Research in applied science will still continue, but its view will be toward greater durability, versatility, and recycling potential in the flow of goods, thus contributing to minimizing the flow. Service functions of universities will no longer be marketing procedures that expand wants or cater to fashion or fad. Rather, services will develop in fields of conservation, waste abatement, pollution monitoring, and control. The age range of students will probably expand; older people will be more evident in classes. Also, the old Greek distinction between education and training will become much clearer to people than it is now. No longer will we consider education as basically an investment, but we will more and more see education as an end in itself. Justification for training will not consider whether it is a good investment for growth, but rather whether training causes a more efficient constant capital stock or a further minimization of

the flow of goods produced. Since there will be no net investment—merely replacement of depreciated capital—the whole rhetoric of applying economic investment concepts to training and education will very nearly cease. Much more than at present, teaching in higher education will keep in view the great interrelatedness of things. Specialists will exist, but broad areas will be taught and will have equal status with specialist teaching. We are already seeing biologists who take up ecology and demography, economists who carefully consider ecology and physics, humanists who consider geology and conservation. Looking and teaching outside one's specialty will not be a sideline or a luxury; it will be central to the curriculum and the teaching process in steady-state institutions of higher education.

STRAWS IN THE WIND

Now and in the recent past, an increasing number of signs indicate that the incredible epoch of industrial, urban, and population expansion beginning in Europe about 300 years ago and accelerating in the twentieth century is nearing an end. We shall now consider social and educational "straws in the wind" indicating the likelihood that movement toward "no-growth" or negative growth is strengthening in cultural and social institutions here and abroad.

Current Trends

We are all aware that environmentalists have in recent years strongly challenged such long-approved themes as development, growth, and expansion. Zero Population Growth, the Sierra Club, and a variety of other no-growth, antidevelopment, or conservation groups have made an impression on American values, particularly at higher steps on the educational pyramid. Many schools of engineering offer courses in socio-engineering where doubt is expressed about the ability of technologists to overcome all problems. Schools of medicine are devoting more time to family planning, nutrition, and related themes. In colleges of arts and sciences, environmental and population themes have emerged strikingly in economics, sociology, geography, biology, and even history. Easy acceptance of the possibility, probability, and desirability of further growth has been severely shaken among the intellectual elite in the United States. The mass of people have

not yet been severely affected in their value perceptions, but talk about energy problems, over-population, and pollution has made some perceptible shifts in mass opinion. For example, in a recent nationwide Gallup poll people said they were highly concerned with pollution of water, air, and countryside—much more concerned than they had been eight years earlier in a similar study. Many American schools, both elementary and secondary, began to focus on environmental questions by the late 1960s. School polls, special days, and subject units in biology, social studies, and health touched on issues that implied that the desirability of growth was debatable. Eminent economists like Kenneth Boulding have made terms such as "spaceship earth" known beyond the realms of academia. Various state and city officials have come out against growth in Oregon, Vermont, San Francisco, Boulder and Vail, Colorado, and elsewhere. Public finance studies for urban areas are more often reporting that, for educational resources, a new house brings less to schools in tax revenue than the educational cost it entails. When the U.S. population clock in Washington registered 200,000,000 in the late 1960s, there was some jubilation. But many are now hoping it will never reach 300,000,000. Not all school children are exhorted to cheer an excess of births and immigrants over deaths and emigrants. A recent article in the *Peabody Journal of Education* indicated that high school students, at least those with upper-middle-class backgrounds, were ready and anxious to have class time devoted to "sexuality, population education, and environmental problems, as long as they are informed by professionals who are willing to be patient and completely honest."

A slow shift to a different orientation about population and economic growth is evident outside the schools also. To cite one example: In the December, 1974 issue of *The American Legion Magazine* three articles were devoted to 1) the problem of illegal aliens, primarily Mexicans, coming into the United States, 2) the need to stop worldwide growth in population, and 3) the need to stop the production of nonreturnable beverage containers in the United States. Isaac Asimov asserted in the second article that by 2000 A.D. the world will have agreed to "bring the population rise to a halt and even to reduce the population to some reasonable level—to perhaps no more than a billion people." In such a world the population's average age will rise, and society will

have to become "age-blind." Asimov says, "The most effective aspect of age-blindness would be to break entirely with tradition and make education the continuing right of all." This lifelong chance of education will reduce the plague of over-specialization now afflicting society and will diminish the negative effects of an older population on the vitality of civilization. If *The American Legion Magazine* is now interested in such matters, it appears that the direction of our values in America is changing.

A Last Word

Is modern industrial society racing down the road to catastrophe and pushing doomsday closer? Publication in the 1960s of Rachel Carson's *Silent Spring* and the prophecy of dire results of the population explosion by Paul Erlich, marked the beginning of a series of warnings to reorder our values and our priorities. Classroom teachers in the United States and abroad have to some degree reflected the trend, though most teachers shift orientation slowly. Yet unpleasant predictions by the Club of Rome and others continue to bombard the thoughtful teacher with depressing scenarios that must provoke unease. The need to change curricula to reflect some newly emerging facts of life (or death) is unpleasant news to those in the educational establishment who control and manipulate curricula. The most stubborn and obdurate problems facing all of us are social and pedagogical rather than merely technological. The future requires a philosophical attitude allowing for self-discipline in controlling and regulating multiple technological innovations as well as social, economic, and demographic trends. Concern for social costs and benefits is increasingly necessary in considering any technological change. Do we really need 231 different lines and model specifications annually in the motor trade?

Educators must heed the call for a decreasing population and the demand for stopping economic growth. The mania in the industrial world where a man gets a shaver that shaves faster so he can get to his office to design a yet faster shaver ad infinitum must be overcome, if we are to successfully conserve our resources. Otherwise, the conditions created by unlimited growth and expansion will destroy our hopes of a more livable world for us and for our descendants.

Recent Publications Relating to the Steady-State Concept

The reader who would like to delve further into the issues brought out in this fastback may wish to consider the following:

Commission on Population Growth and the American Future. *Population and the American Future: Report of the Commission.* Washington, D.C.: Government Printing Office, 1972.

This report discusses a great range of problems relating to population. It is an important step forward in involving the United States government in population control. Of particular interest is its strong recommendations for sex and population education.

Daly, Herman E., ed. *Toward a Steady-State Economy.* San Francisco: Freeman, 1973.

This is a collection of articles which discuss primarily the economic problems of getting to and maintaining a steady-state economy. It is the best anthology on this subject currently available.

Georgescu-Roegen, Nicholas. *The Entropy Law and the Economic Process.* Cambridge, Mass.: Harvard University Press, 1971.

The author shows how the second law of thermodynamics applies to economics. Mankind's dowry of low entropy (usable terrestial energy and materials) is limited and therefore further economic growth and population growth based on such sources is inevitably self-defeating.

Meadows, Dennis L., et al. *The Limits to Growth.* New York: Universe Books, 1972.

This first report for the Club of Rome caused much stir. It was based on a computer study conducted at M.I.T. which showed that growth has to end within a few decades. The variables considered were population and economic and ecological trends.

Mesarovic, Mihaglo, and Pestel, Eduard. *Mankind at the Turning Point: The Second Report to the Club of Rome.* New York: E. P. Dutton/ Reader's Digest, 1974.

This book considers certain qualifications and practical problems which were not fully considered in the first Club of Rome report.

The No-Growth Society. Daedalus, (Fall, 1973).

Fourteen excellent articles by eminent economists, sociologists, philosophers, and physical scientists are found in this issue. The benefits and drawbacks of no-growth are the themes.

Raspail, Jean. *The Camp of the Saints*. Translated by Norman Shapiro. New York: Scribner's, 1975.

This is an apocalyptic novel which draws a horrible picture of the future degradation of civilization. The uncontrolled population of the Third World is Raspail's villain. One may not agree with Raspail, but his scenario must worry us all.

Westoff, Charles F., et al. *Toward the End of Growth: Population in America*. Englewood Cliffs, N.J.: Prentice-Hall, 1973.

This is a collection of very perceptive essays dealing primarily with the decline in fertility in the United States over the past few years. Policies aimed at reducing fertility are discussed in a number of articles.

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